(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property **Organization**

International Bureau





(43) International Publication Date 23 December 2004 (23.12.2004)

PCT

(10) International Publication Number WO 2004/111552 A2

(51) International Patent Classification7:

F25B

(21) International Application Number:

PCT/US2004/018688

(22) International Filing Date:

9 June 2004 (09.06.2004)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

0313317.0

10 June 2003 (10.06.2003) GB

(71) Applicant (for all designated States except US): BORE-ALIS TECHNICAL LIMITED [—/US]; 23545 N.W. Skyline Boulevard, North Plains, OR 97133-9204 (US).

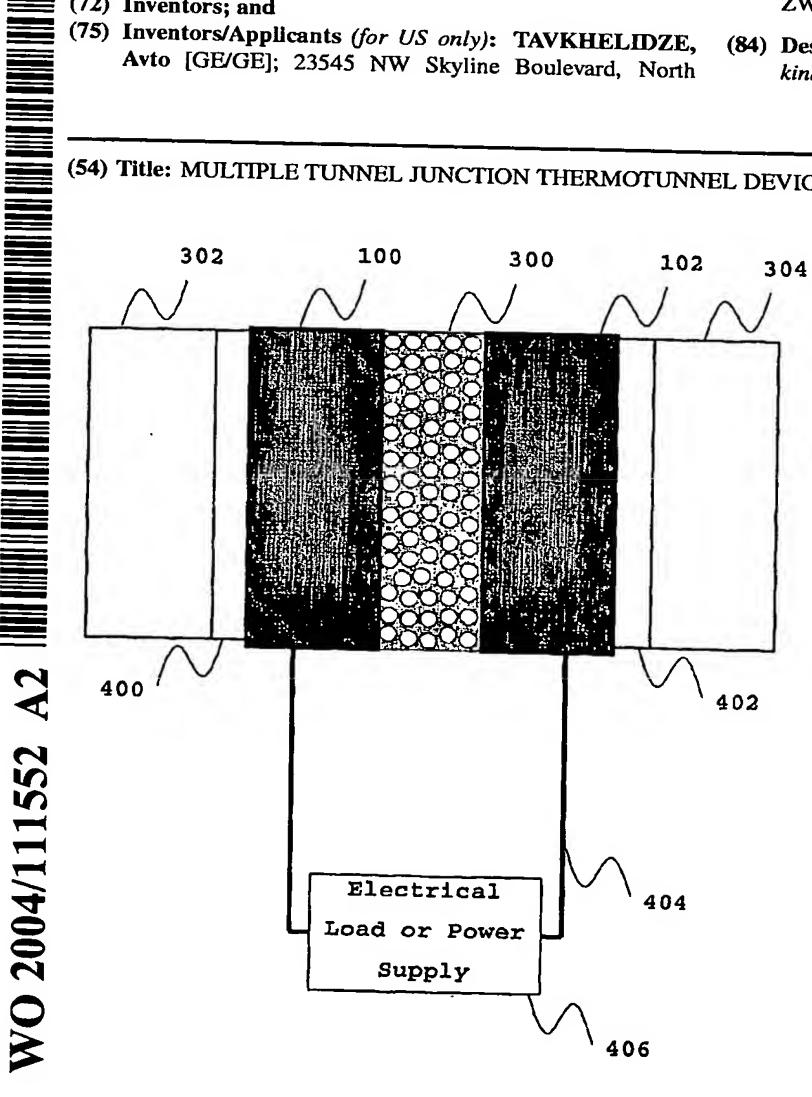
(72) Inventors; and

(75) Inventors/Applicants (for US only): TAVKHELIDZE, Avto [GE/GE]; 23545 NW Skyline Boulevard, North Plains, OR 97133-9204 (US). COX, Isaiah, W. [US/GB]; 27 Heathway Court, London NW3 7TS (GB). COX, Rodney, T. [US/US]; 23545 NW Skyline Boulevard, North Plains, OR 97133-9204 (US).

- (74) Agent: BOREALIS TECHNICAL LIMITED; Rodney T. Cox, Chairman and CEO, 23545 NW Skyline Boulevard, North Plains, OR 97133-9204 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH,

[Continued on next page]

(54) Title: MULTIPLE TUNNEL JUNCTION THERMOTUNNEL DEVICE ON THE BASIS OF BALLISTIC



(57) Abstract: The present invention is a tunnel diode, in which the space between the emitter electrode and the collector electrode is occupied by a porous material which has a thickness less then the free mean free path of an electron in the porous material. The present invention also includes heat pumping and power generation devices comprising the tunnel diode.

A2 ||||||||||||||| WO 2004/111552

WO 2004/111552 A2

GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.